

# U.S. Census Bureau Index of Economic Activity (IDEA)

Census Scientific Advisory Committee  
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# What is IDEA?

- Census issues many different economic data series. An index constructs a single measure that combines information from many different series
- U.S. Census Bureau Index of Economic Activity (IDEA) is an aggregation of 15 of Census Bureau's primary economic data series
  - Indexes can give users “chunks” of information that are easier to digest
  - Small Business Pulse Survey has indexes that help summarize information for users (e.g., overall sentiment index, operational challenges index, expected recovery index)
  - Weekly Economic Index (WEI) by Lewis, Mertens, and Stock and the Chicago Fed National Activity Index (CFNAI)
- The index is updated each business day as new values of any of its input data sources are released to the public

# Website

- IDEA serves as a complement to the Economic Indicators dashboard
- IDEA is located above the Briefing Room cards

You are here [Census.gov](#) [U.S. Census Bureau Economic Indicators](#)

## Economic Indicators

### Census Bureau Index of Economic Activity



Select an indicator:



# Methodology

- We use Principal Components Analysis (PCA) to construct the index. One interpretation is the premise is that there is a factor common to all the data series (i.e., a latent variable that drives the co-movement of all the underlying series). PCA tries to estimate this latent variable
- Same methodology used to construct the Weekly Economic Index (WEI) by Lewis, Mertens, and Stock and the Chicago Fed National Activity Index (CFNAI)
- Example: If we have variables  $X_1$  and  $X_2$  then we find weights  $w_1$  and  $w_2$  to calculate index,  $w_1 * X_1 + w_2 * X_2$  (first principal component)

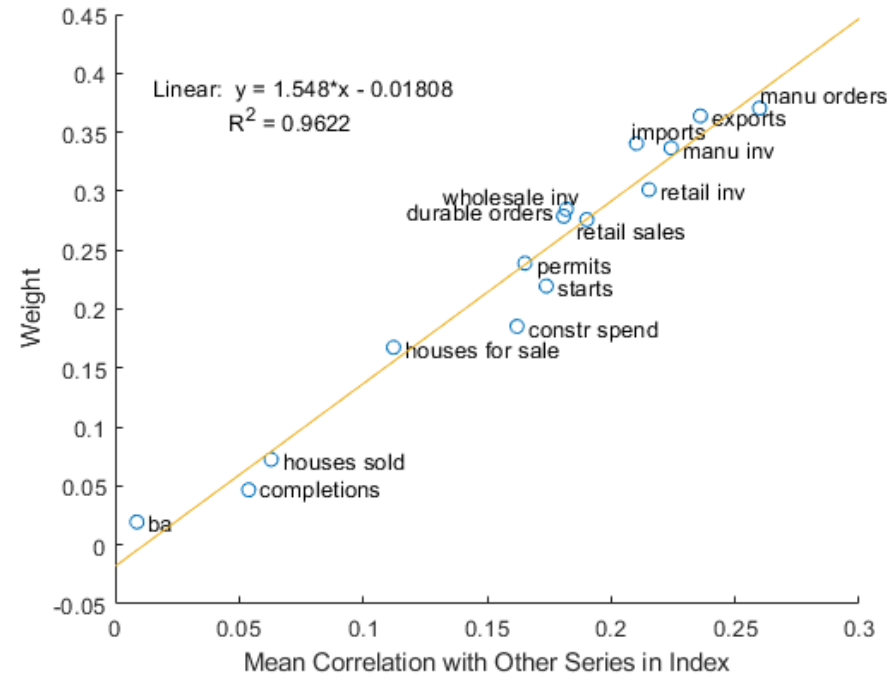
# Application to Census Data

- We apply this methodology to the monthly “headline” principal federal economic indicators (PFEIs) issued by Census
  - PFEIs are widely watched and correlated with economic activity
  - Focused on Census data series in case there are major outliers or revisions in series
  - We began with a larger list eliminated some colinear series
  - Large overlap with series on Economic Indicators dashboard
- We apply PCA to 15 monthly time series starting from July 2004 (all have been seasonally adjusted)
- Code uses API to download data series
- PCA is applied to standardized monthly growth rates
  - Compute differences of logged variables (growth rate) and standardize
  - Standardized variables have mean zero and standard deviation of 1
- When constructing the PCA weights, we remove the COVID-19 time period (we use data for July 2004 to February 2020)

# Data series used in Economic Index

<u>Series</u>	<u>Source</u>	<u>Sector</u>	<u>PCA Weight</u>
Manufacturing Value of New Orders	Manufacturers' Goods	Manufacturing	0.37
Exports of Goods and Services	International Trade: Goods & Services	International Trade	0.36
Imports of Goods and Services	International Trade: Goods & Services	International Trade	0.34
Manufacturing Inventories	Manufacturers' Goods	Manufacturing	0.34
Retail Inventories	Advance Economic Indicator Report	Retail	0.30
Wholesale Trade Inventories	Advance Economic Indicator Report	Wholesale	0.29
New Orders for Durable Goods	Advance Report Durable Goods	Manufacturing	0.28
Retail Trade and Food Services Sales	Advance Monthly Retail Trade	Retail	0.27
Housing Units Authorized in Permit-Issuing Places	New Residential Construction	Construction	0.24
Housing Units Started	New Residential Construction	Construction	0.22
Total Construction Spending	Construction Spending	Construction	0.19
New Single-Family Houses for Sale	New Residential Sales	Construction	0.17
New Single-Family Houses Sold	New Residential Sales	Construction	0.07
Housing Units Completed	New Residential Construction	Construction	0.05
Business Applications	Business Formation Statistics	Business Formations	0.02

# Data series used in Economic Index



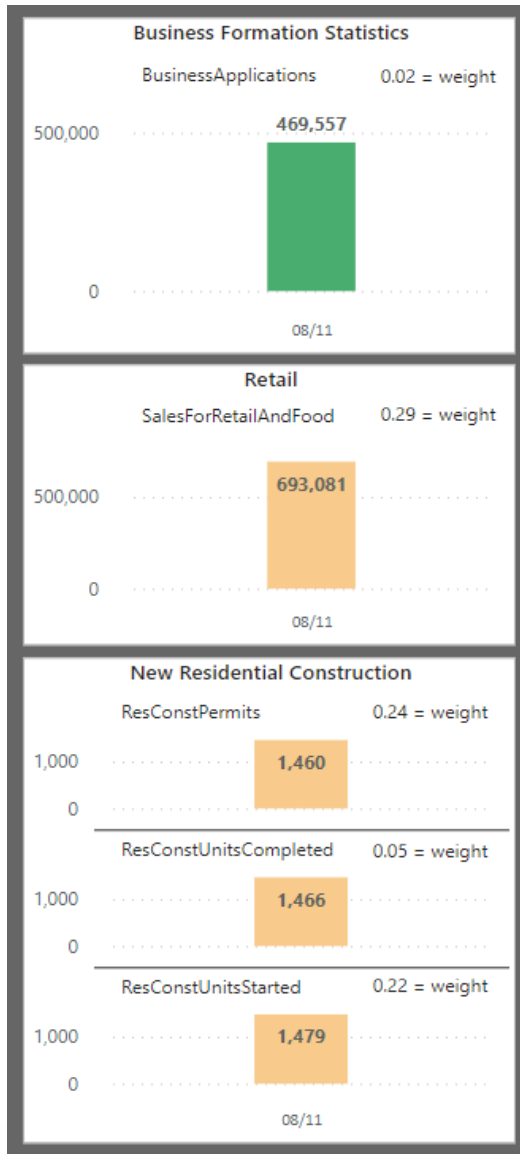
- Above plot shows the weight of each series and the mean correlation with the other 14 series in the index
- PCA assigns higher weights to series that are most correlated with other series
- Series related to manufacturing, international trade, retail, and wholesale receive the highest weights

# Nowcasting

- We apply a nowcasting methodology in calculating the index
- Let's discuss how nowcasting works for July 2023 with an example
- August 11
  - Business Formation Statistics for the month of July 2023 were released and was the first series released covering July
  - We “nowcast” the remaining 14 series that are missing July 2023 values
- August 15
  - Advance Monthly Sales for Retail and Food Services for the month of July 2023 were released
  - We “nowcast” the remaining 13 series that are missing July 2023 values
- We continue adding data to the index throughout the month and nowcast any missing values
- Note: revised data is continually incorporated into the index



July Input Values as of 8/11

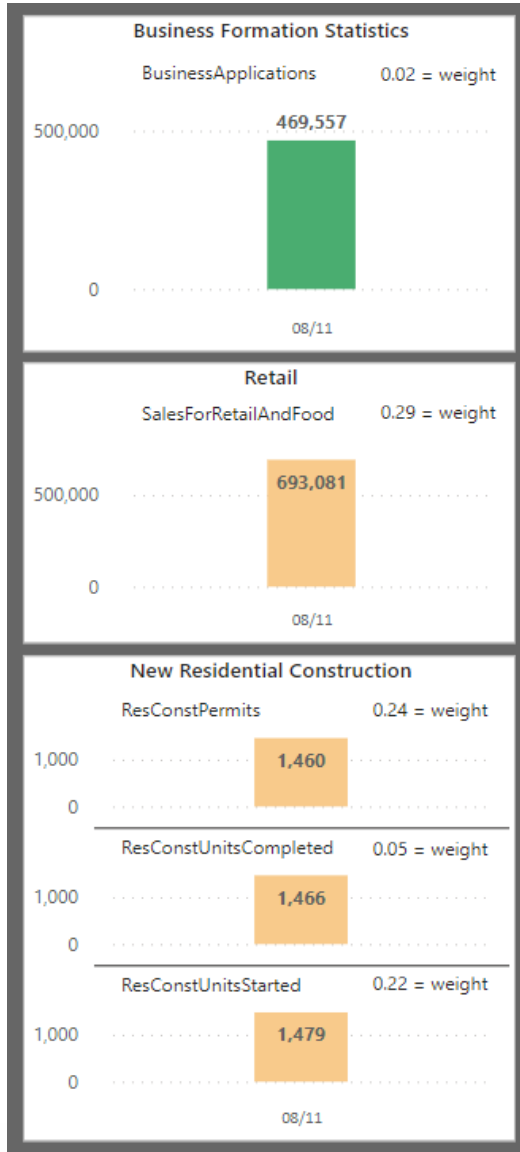


## Key

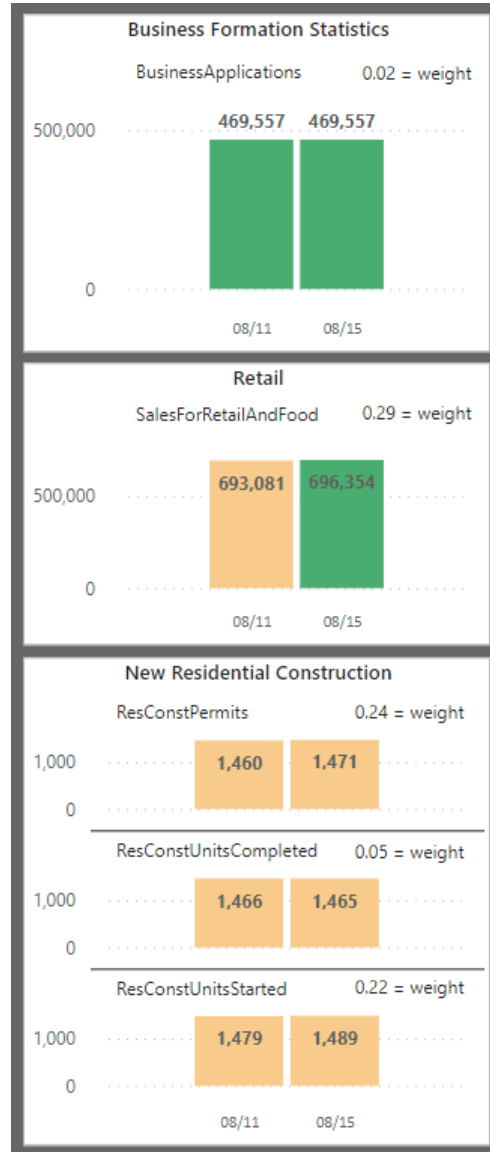
Green – Actual Values

Yellow – Forecast Values

July Input Values as of 8/11



July Input Values as of 8/15



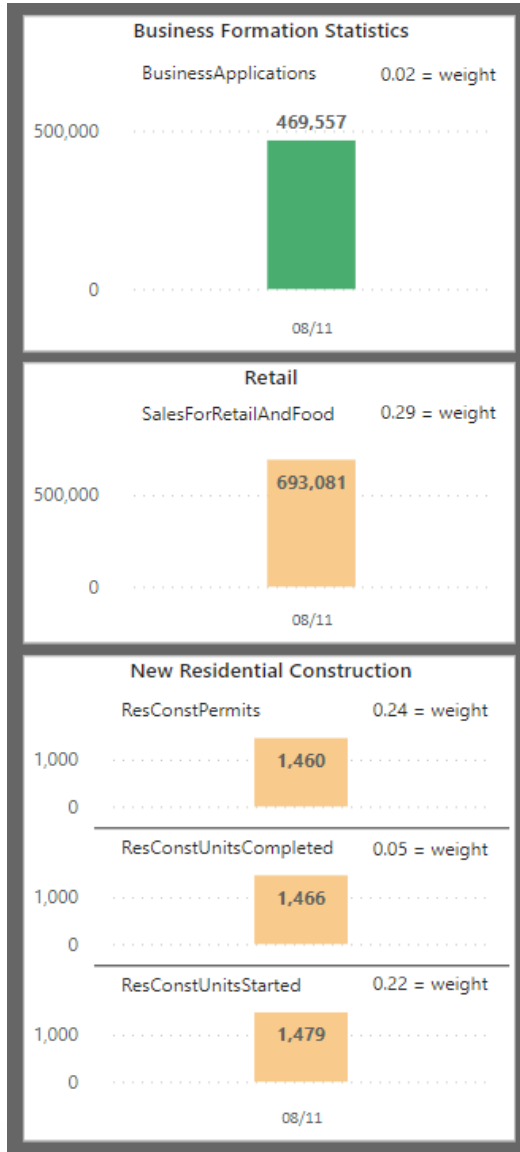
## Key

Green – Actual Values

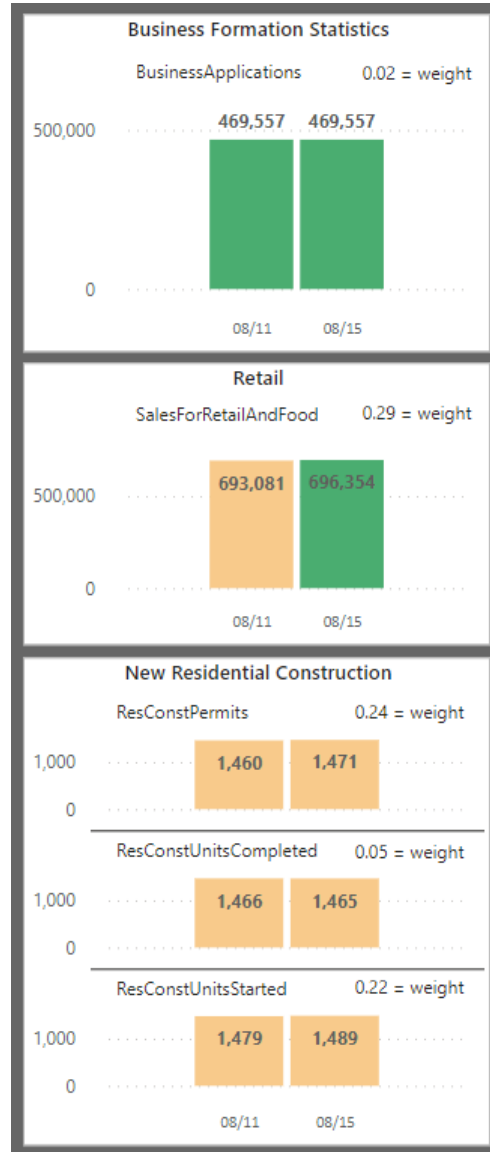
Yellow – Forecast Values

# Nowcasts in Action

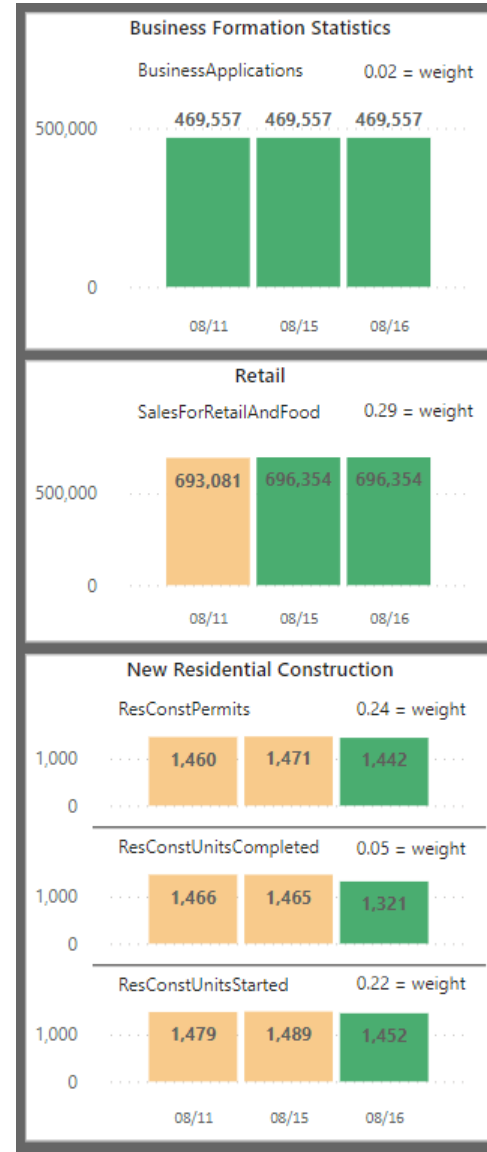
July Input Values as of 8/11



July Input Values as of 8/15



July Input Values as of 8/16



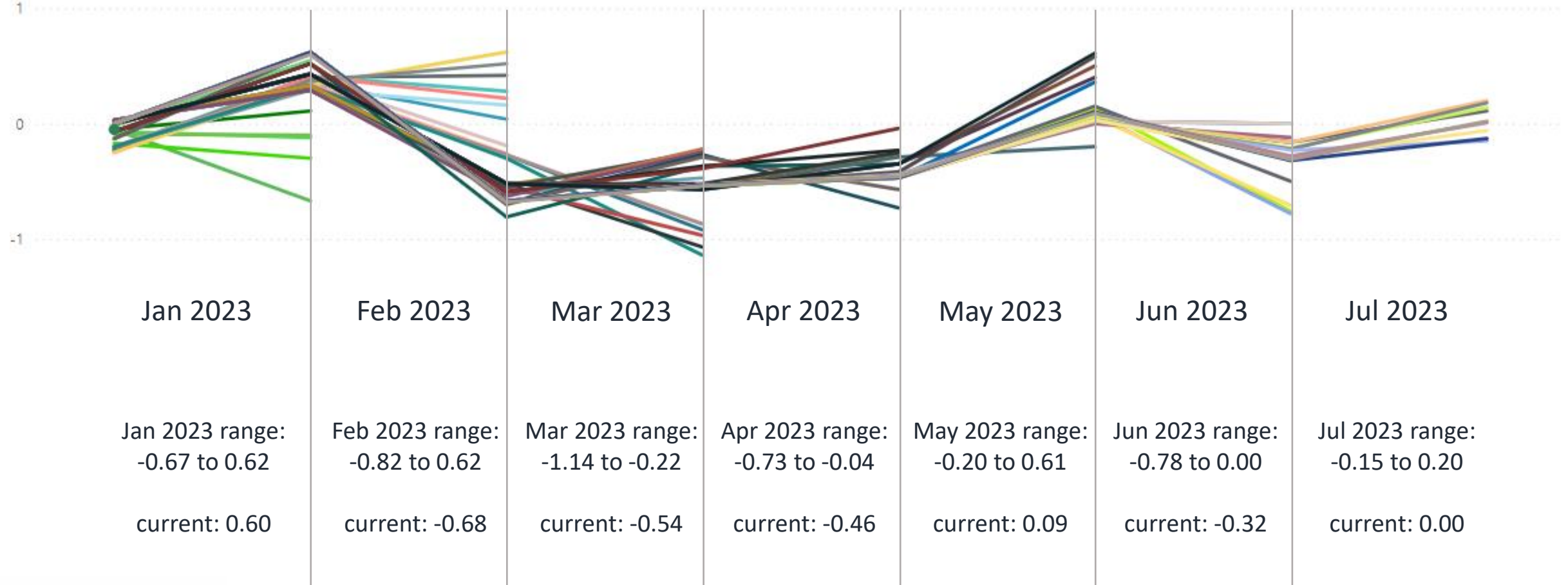
## Key

Green – Actual Values

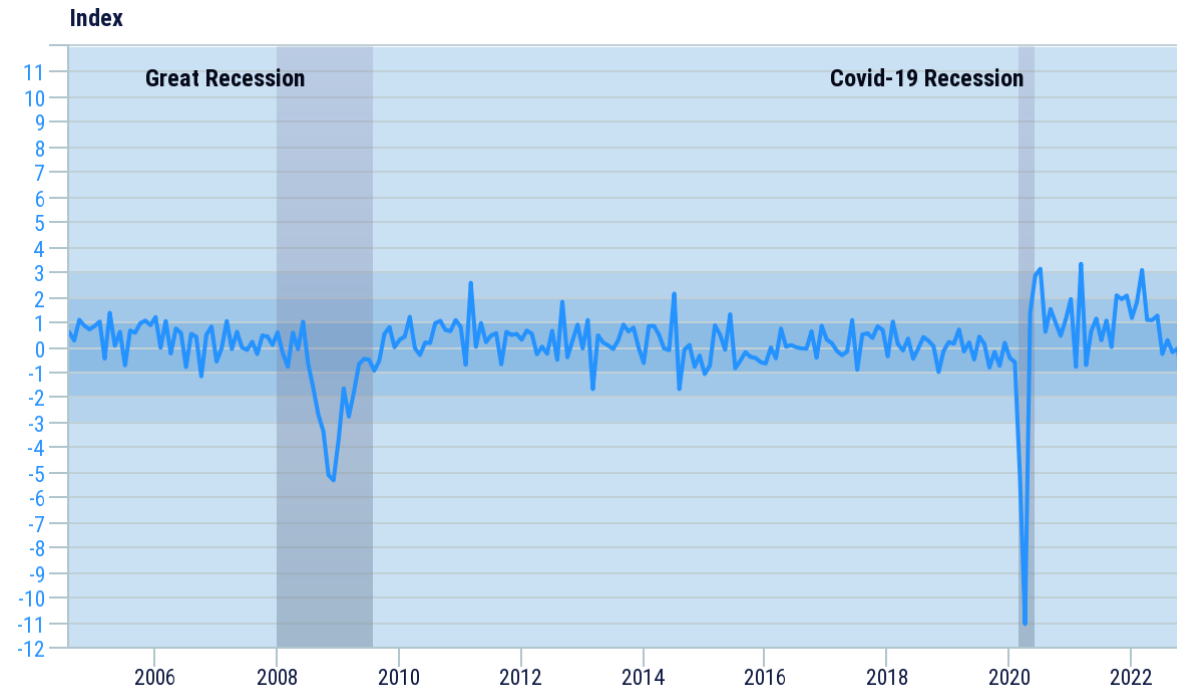
Yellow – Forecast Values

# Index movement through the month

Monthly Index Values Over Time

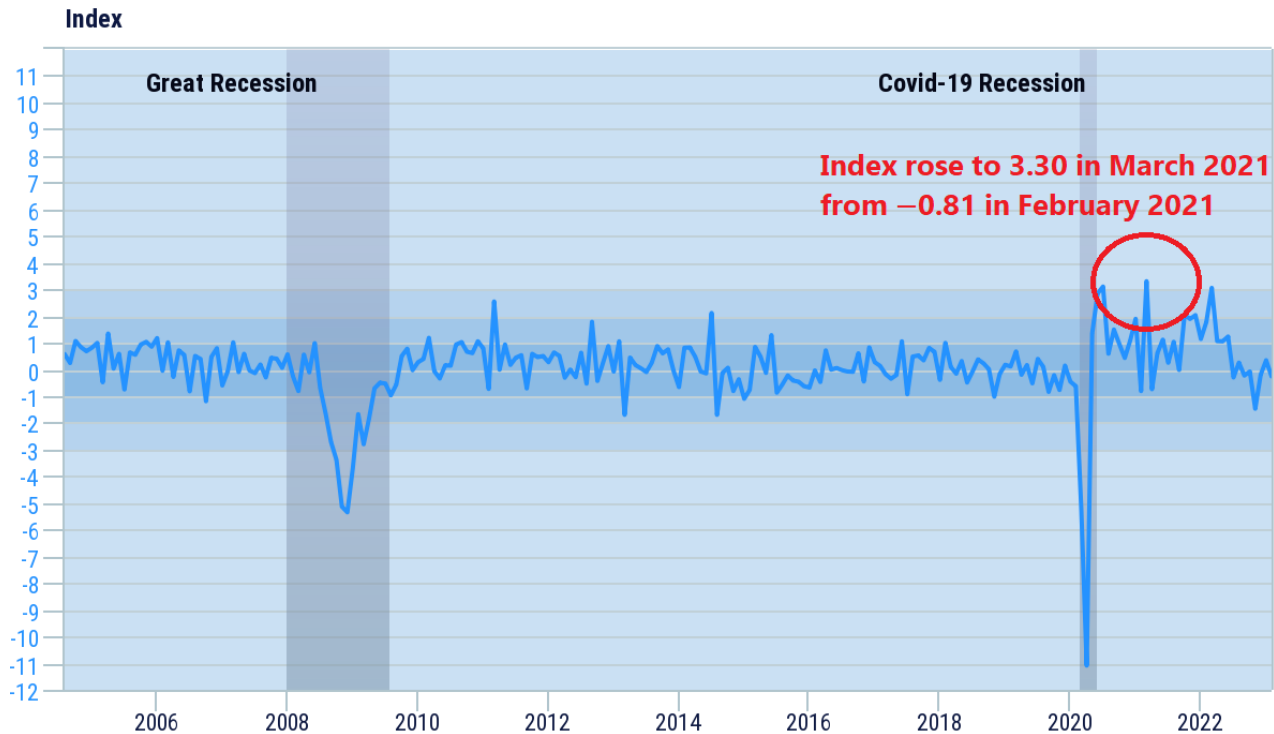


# Index Plot



- Graph that characterizes whether economic activity is within a normal range using process control practices
- We standardize the index using the mean and standard deviation of August 2004 to February 2020
- Great Recession and COVID-19 pandemic clearly reflected in index

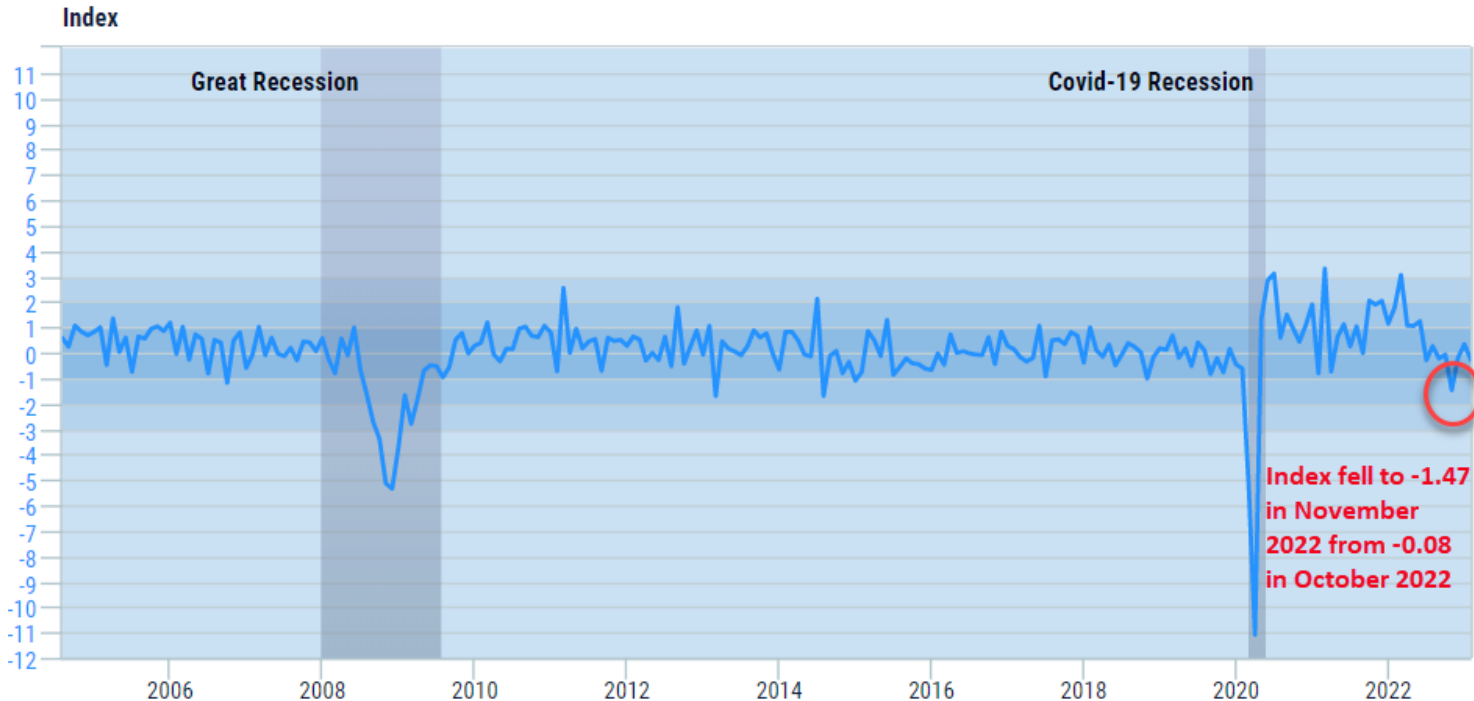
# What is causing movement in the index?



## March 2021

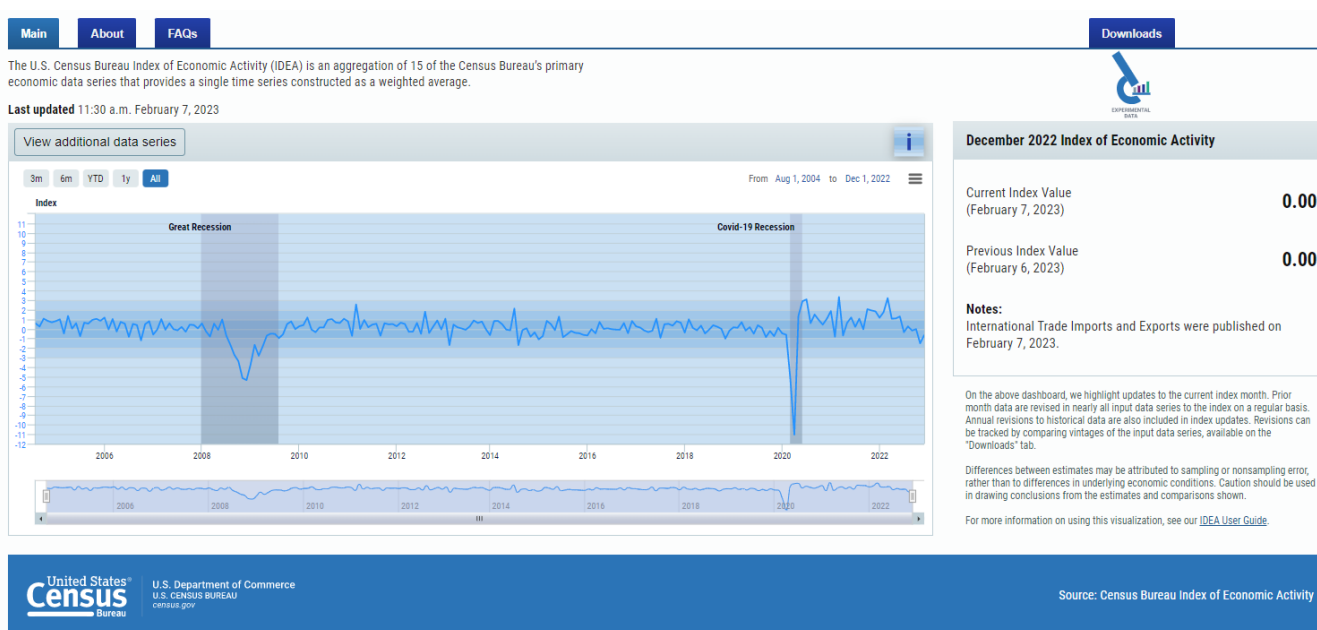
Series	Month-to-Month % Change	PCA Weight
Manufacturing Value of New Orders	1.00	0.37
Exports of Goods and Services	7.22	0.36
Imports of Goods and Services	6.47	0.34
Manufacturing Durable Goods Inventories	0.35	0.34
Retail Inventories	-1.38	0.30
Retail Trade and Food Services Sales	11.20	0.28
New Orders for Durable Goods	1.65	0.28
Wholesale Trade Inventories	0.96	0.28
Housing Units Authorized in Permit-Issuing Places	1.72	0.24
Housing Units Started	19.65	0.22
Total Construction Spending	1.96	0.19
New Single-Family Houses for Sale	-0.32	0.17
New Single-Family Houses Sold	14.71	0.07
Housing Units Completed	9.76	0.05
Business Applications	6.14	0.02

# What is causing movement in the index?



## November 2022

Series	Month-to-Month % Change	PCA Weight
Manufacturing Value of New Orders	-1.93	0.37
Exports of Goods and Services	-1.82	0.36
Imports of Goods and Services	-6.34	0.34
Manufacturing Durable Goods Inventories	0.03	0.34
Retail Inventories	-0.04	0.30
Retail Trade and Food Services Sales	-1.07	0.28
New Orders for Durable Goods	-1.80	0.28
Wholesale Trade Inventories	0.82	0.28
Housing Units Authorized in Permit-Issuing Places	-10.65	0.24
Housing Units Started	-0.49	0.22
Total Construction Spending	1.77	0.19
New Single-Family Houses for Sale	-2.15	0.17
New Single-Family Houses Sold	-1.19	0.07
Housing Units Completed	13.41	0.05
Business Applications	-3.12	0.02



# IDEA Website Walkthrough

[IDEA Data Visualization, hosted on Census Bureau Economic Indicators Briefing Room Page](#)

[IDEA User Guide, with a written walkthrough of the website](#)



# Conclusions

- The IDEA has served as a useful tool to track a more comprehensive view of economic activity in real time.
- Data users are able to view the IDEA components on the same publication page (the Economic Indicators Briefing Room).

# Questions for Discussant

- What series should we add next?
- Currently the span we use in the model is August 2004 – February 2020 to avoid the pandemic period. What should we update that span to?
- What are some possible areas to develop to make IDEA as informative as possible to users?